

IV. SOCIO-ECONOMIC ASSESSMENT OF THE 1985 OCEAN SALMON FISHERIES

A great deal of descriptive socio-economic background information was provided in the following salmon management documents: "1984 Ocean Salmon Fisheries Review" (section IV), "1983 Review of the Ocean Fisheries and 1984 Status of the Stocks Report" (section IV), Chapter V of the 1983 and 1982 Salmon Plan Amendments, and Appendix B ("Social and Economic Description of the Salmon Fisheries") of the 1981 Salmon Plan Amendment. That information is generally still valid and is therefore incorporated into this report by reference.

Section IV of this report presents available information on 1985 market conditions, ex-vessel values, effort characteristics, and the impact of 1985 commercial troll and recreational ocean salmon seasons on user groups and coastal communities. The 1985 impacts are compared both to those observed in 1984 and to a ten-year 1976-1985 average.

Overview of 1985 Market Conditions

In 1985, the ex-vessel prices received for west coast troll-caught salmon decreased over those reported in 1984. United States cold storage holdings in April 1985 of chinook and coho were 1,489,000 and 3,562,000 pounds representing a 38 percent and 254 percent increase, respectively, from holdings in April 1984 (NMFS Fishery Market News). The increase in preseason inventories favored a decrease in ex-vessel prices. Several other factors which influenced the price received for troll salmon in 1985 are described below.

Strength of the U.S. Dollar Relative to Foreign Currencies

The U.S. dollar has remained strong in foreign exchange markets. This has tended to reduce the demand for U.S. salmon overseas, due to the decreased real purchasing power of the foreign currency. As a result, substitutes for U.S. salmon in foreign markets have had an advantage. For example, prior to 1983 the United States was the leading salmon exporter to the European community in value terms. Since 1983, Norway has replaced the United States as the top supplier (in value) of salmon to European countries. Table IV-1 compares the total exports of fresh, chilled or frozen salmon products (excluding salmon roe) from January through November in 1984 and 1985. The total value exported to all nations, adjusted for inflation, increased by 31 percent in 1985 while the total value exported to Japan increased by 41 percent in real dollar terms. The value of exports of chinook salmon to all countries increased 15 percent during 1985.

Competition from Pen-Reared Atlantic Salmon

Imports of fresh salmon, principally farmed Atlantic salmon, to the United States continued its increasing trend in 1985 as illustrated in Table IV-2. The total value of fresh salmon imports by October of the year was \$45,217,000, a 32 percent increase over 1984 imports.

The largest producer of pen-reared Atlantic salmon is Norway. In 1985, U.S. imports of Norwegian fresh salmon during January through October were 11,180,000 pounds, an increase of 55 percent over 1984 (Table IV-2). The cost, insurance, and freight (CIF) prices at port of entry received for this salmon averaged \$3.31 per pound. Through October, the dollar value of

Table IV-1. U.S. exports to Japan and to all nations, prior and current year through November 1985.

Species ^{a/}	Through November 1984		Through November 1985	
	Thousands of Pounds	Thousands of Dollars	Thousands of Pounds	Thousands of Dollars
JAPAN				
Chinook	2,336	\$ 5,562	3,039	\$ 7,197
Chum	12,400	13,332	17,605	20,493
Pink	22,397	16,441	30,073	23,087
Sockeye	123,641	211,287	151,472	296,112
Salmon Other ^{b/}	6,205	9,660	20,827	33,433
Salmon Fillets	<u>467</u>	<u>915</u>	<u>383</u>	<u>850</u>
Total	167,446	\$257,197	233,399	\$381,172
ALL NATIONS				
Chinook	3,423	\$ 8,363	4,215	\$ 9,640
Chum	32,791	40,242	36,430	45,013
Pink	34,255	25,380	50,181	35,265
Sockeye	127,126	217,965	153,712	300,675
Salmon Other ^{b/}	22,154	38,615	36,450	61,561
Salmon Fillets	<u>2,750</u>	<u>5,471</u>	<u>933</u>	<u>1,970</u>
Total	222,499	\$336,036	281,921	\$454,124
% of total purchased by Japan		75%	79%	

a/ Fresh chilled or frozen.

b/ Includes coho plus all unspecified salmon.

Source: Fishery Market News, NMFS.

Table IV-2. Major U.S. imports of fresh salmon by country, prior and current year through October 1985.

Country of Origin ^{a/}	Through October 1984		Through October 1985	
	Thousands of Pounds	Thousands of Dollars	Thousands of Pounds	Thousands of Dollars
Norway	7,209	\$23,894	11,180	\$36,990
Canada	3,766	7,728	1,977	3,382
Netherlands	340	1,212	94	300
United Kingdom	151	539	788	2,710
Finland	133	451	46	111
Denmark	15	52	2	8
New Zealand	18	48	117	286
Spain	11	42	32	72
Ireland	0	0	30	108
Macao	0	0	69	230
Belgium & Luxembourg	<u>3</u>	<u>14</u>	<u>28</u>	<u>108</u>
Total ^{b/}	11,724	\$34,155	14,799	\$45,217

a/ Countries exporting over 2,000 pounds of fresh salmon to the United States.

b/ All nations.

Norwegian fresh salmon imported was \$36,990,000, approximately 1.9 times the total ex-vessel value landed by the Washington, Oregon, and California ocean troll fisheries in 1985. The number of countries importing fresh salmon to the United States has also increased.

Conditions in the Alaskan Salmon Fisheries

The majority of the salmon landed and processed in the United States originates in Alaska and, therefore, events in the Alaska salmon fisheries have an impact on Washington, Oregon, and California as well. Alaskan harvesters landed 51,714,000 pounds of chinook and coho, a 17 percent increase over 1984. Total value of Alaska landings of all species of salmon (chinook, coho, sockeye, pinks, and chum) was 370 million dollars. The southeast Alaska troll fishery harvested 3,281,000 pounds of chinook and 11,630,000 pounds of coho for a total estimated value of 22 million dollars. Average prices per pound ranged from \$2.07 to \$2.19 for chinook and from \$1.25 to \$1.32 for coho.

Ex-vessel Prices and Values for the 1985 Ocean Troll Fishery

Seasonal Trends

California - Initial market order price levels per dressed pound set for chinook salmon were \$2.80 for large, \$2.40 for medium, and \$1.95 for small chinook. However, in late May as sources of the less expensive Alaskan salmon became available ex-vessel prices dropped considerably. This led to a tie-up of vessels between May 29 and June 7 with very few fish being delivered. New market order prices per pound of \$2.50 for large, \$2.30 for medium, and \$1.90 for small fish were agreed upon and these prices remained stable through most of the season, increasing to \$2.70 for large fish at the end of the season when deliveries were light (Table IV-3). Actual prices received from some buyers, particularly in southern ports, were higher than the market order prices.

The majority of the chinook landed were large, with an average weight of 12.5 pounds. This caused some problems initially because restaurant and retail markets prefer medium sized fish. Coho prices reported in Fort Bragg ranged from \$1.45 to \$1.90 per pound.

Oregon - Prices per pound for chinook were highest in May (\$2.99 for large chinook), dropping by approximately \$0.30 per pound in June and then remaining relatively stable for the rest of the season (Table IV-4). The season averages for chinook were as follows: large chinook, \$2.67 per pound; medium chinook, \$2.43 per pound; small chinook, \$2.03 per pound, and mixed chinook \$2.48 per pound. The overall average price per pound for Oregon coho and pink salmon were \$1.51 and \$0.65, respectively.

Washington - Average ex-vessel price per pound received for troll-caught chinook and coho landed in Westport and Ilwaco are shown in Table IV-5. Information on prices paid by market size category was unavailable; the values presented are the average price paid per month for all troll-caught chinook and coho landed. Average monthly price per pound for chinook ranged from \$2.61 to \$2.39 in Westport and from \$2.60 to \$2.49 in Ilwaco. Coho prices ranged from \$1.25 to \$1.50 per pound while pink prices varied from \$0.51 per pound to \$0.62 per pound.

Table IV-3. Average monthly ex-vessel price.^{a/}

	May	June	July	Aug.	Sept.
<u>Fort Bragg</u>					
Large Chinook	2.80	2.50	2.50	2.50	2.70
Medium Chinook	2.40	2.30	2.30	2.30	2.50
Small Chinook	1.95	1.90	1.90	1.90	2.50
Coho		1.90	1.45	1.45	
<u>San Francisco</u>					
Large	2.80	2.50	2.50	2.50	2.70
Medium	2.40	2.30	2.30	2.30	2.70
Small	1.95	1.90	1.90	2.30	2.70
<u>Monterey</u>					
Large	2.80	2.50 ^{b/}	2.50 ^{b/}		
Medium	2.40	2.30	2.30		
Small	1.95	1.90	1.90		

a/ These are largely based on market order prices. Some buyers paid over the market order price. These most likely reflect the minimum price received.

b/ Reports that some Monterey buyers were paying up to \$3 per pound.

Table IV-4. Average monthly ex-vessel price, Oregon.

	Ex-vessel Price/lb.							
	May	June	July	Aug.	Sept.	Oct.	Nov.	Season
<u>Chinook</u>								
Large (>11 lbs.)	\$2.99	\$2.65	\$2.62	\$2.61	\$2.61	2.59	2.75	\$2.67
Medium (7-11 lbs.)	2.58	2.39	2.41	2.40	2.40	2.40	2.51	2.43
Small (<7 lbs.)	2.14	1.99	2.01	2.00	2.00	2.00	2.00	2.03
Mixed Chinook	2.74	2.60	2.43	2.35	2.41	2.31	NA	2.48
<u>Coho</u>								
Large (>9 lbs.)			NA	1.55				1.55
Medium (3-9 lbs.)			1.91	1.64				1.76
Small			1.52	1.50				1.53
Mixed Coho			1.51	1.51				1.51
Pink	0.73	0.80	0.67	0.64	0.65			0.65

Table IV-5. Average monthly prices in 1985 in Westport and Ilwaco.

	May	June	July	Aug.	Sept.
<u>Chinook</u>					
Westport	2.61	2.77	2.44	2.39	2.39
Ilwaco	2.60		2.47	2.49	
<u>Coho</u>					
Westport			1.25	1.50	
Ilwaco			1.50	1.50	
<u>Pink</u>					
Westport			0.61	0.51	
Ilwaco			0.62	0.56	0.61

Annual Trends

Available salmon ex-vessel price and value data by species, compiled from state fish tickets and expressed both in nominal terms and in 1985 dollars are presented in Tables IV-6, IV-7, and IV-8. Trends in ex-vessel value landed from 1979 to 1985 are shown in Figure IV-1. For the entire Council management area and associated state territorial waters, the total nominal ex-vessel value landed in 1985 was \$19,384,000. This represents an increase of 96 percent from the 1984 value but remains only 49 percent of the 1976-1985 average in real value terms.

California - The total value of commercial salmon landings in California was \$11,535,000 a 48 percent increase relative to 1984 total value figures, and 70 percent of the 1976-1985 average. The increase over 1984 was the result of increased chinook harvest in terms of number of fish (20 percent) and a greatly increased average weight per chinook (12.5 pounds per fish compared with 8.7 pounds, Appendix D, Table D-1). The entire troll fishery took place south of Point Delgada. The pounds of chinook landed in this area was up 86 percent (73 percent increase statewide) from 1984. Coho harvest decreased and was 77 percent less than in 1984. Chinook ex-vessel values increased by 60 percent in real value terms while coho ex-vessel values increased by 10 percent compared to 1984.

Oregon - Oregon's total troll ex-vessel value was \$5,940,000, a 260 percent increase from 1984 but only 48 percent of the 1976-1985 average (Table IV-7). While the average ex-vessel price received decreased, the number of pounds harvested increased. The average chinook price was 15 percent lower than in 1984 while the average coho price decreased 12 percent. Total chinook and coho pounds landed increased 405 percent relative to 1984; landings were up 269 percent and 581 percent for chinook and coho, respectively. The 1985 pink fishery landed 346,233 pounds for an ex-vessel value of \$168,000; 52 percent of the ex-vessel value of the last significant pink fishery which occurred in 1981.

The average size of chinook landed was 9.4 pounds, an increase over that observed in 1984 (8.5 pounds), but 8 percent below the pre-El Nino (1976-1982) average of 10.2 pounds (see Appendix D, Table D-2). The season average landed dressed weight for coho increased from 5.1 to 5.8 pounds, and was 7 percent below the pre-El Nino average of 5.4 pounds (Appendix D, Table D-2).

Washington - The total ex-vessel value of non-Indian commercial troll chinook and coho landings in Washington was \$1,601,000 a increase of 350 percent from the 1984 value but only 18 percent of the 1976-1985 average (Table IV-8). Chinook and coho ex-vessel values increased by 218 percent and 378 percent, respectively. Prices received for chinook and coho were 10 percent and 14 percent lower than 1984 prices, respectively. Total chinook and coho landings (pounds) were 41 percent higher than in 1984; chinook landings increased 21 percent and coho landings increased 57 percent.

The ex-vessel value of the 1985 pink fishery was \$308,000, 133 percent and 37 percent of the 1983 and 1981 pink ex-vessel values, respectively. The average price per pound was \$0.55, about equal to that in 1983 and 60 percent of that received in 1981.

Table IV-6. Estimates of ex-vessel value^{a/} (in dollars) of California troll landings and average price (dollars/lb.), 1979-1985.

Year	GNP	Chinook				Coho				Total	
	Price Deflator	Nominal Value	Real ^{b/} Value	Nominal Price/lb.	Real ^{b/} Price/lb.	Nominal Value	Real ^{b/} Value	Nominal Price/lb.	Real ^{b/} Price/lb.	Nominal Value	Real ^{b/} Value
1979	70.3	\$17,356,000	\$24,688,000	\$2.53	\$3.60	\$2,303,000	\$3,276,000	\$2.19	\$3.12	\$19,659,000	\$27,964,000
1980	77.1	12,741,000	16,525,000	2.27	2.94	408,000	529,000	1.36	1.76	13,149,000	17,054,000
1981	84.4	13,417,000	15,897,000	2.45	2.90	905,000	1,072,000	1.94	2.30	14,322,000	16,969,000
1982 ^{c/}	89.5	18,754,000	20,954,000	2.55	2.85	735,000	821,000	1.36	1.52	19,489,000	21,775,000
1983 ^{c/}	92.9	4,290,000	4,618,000	2.09	2.25	318,000	342,000	1.25	1.35	4,608,000	4,960,000
1984 ^{c/}	96.8	6,875,000	7,102,000	2.67	2.76	687,000	710,000	1.99	2.06	7,562,000	7,812,000
1985 ^{c/}	100.0	11,390,000	11,390,000	2.56	2.56	125,000	125,000	1.57	1.57	11,535,000 ^{d/}	11,535,000 ^{d/}

a/ Dressed weight value (preliminary).

b/ Expressed in 1985 dollars.

c/ Preliminary.

d/ Includes \$20,000 ex-vessel value from pink landings. Pink nominal price in 1985 was \$0.50/lb.

Table IV-7. Estimates of ex-vessel value^{a/} (in dollars) of Oregon troll landings and average price (dollars/lb.) in 1971-1985.

Year	GNP Price Deflator	Chinook				Coho				Total	
		Nominal Value	Real ^{b/} Value	Nominal Price/lb.	Real ^{b/} Price/lb.	Nominal Value	Real ^{b/} Value	Nominal Price/lb.	Real ^{b/} Price/lb.	Nominal Value	Real ^{b/} Value
1971	41.4	\$ 587,000	\$ 1,418,000	\$0.59	\$1.43	\$ 3,155,000	\$ 7,621,000	\$0.36	\$0.87	\$ 3,742,000	\$ 9,039,000
1972	43.2	982,000	2,273,000	0.75	1.74	2,476,000	5,731,000	0.51	1.18	3,458,000	8,005,000
1973	45.6	3,520,000	7,719,200	1.02	2.24	4,004,000	8,781,000	0.78	1.71	7,524,000	16,500,000
1974	49.6	2,412,000	4,863,000	1.05	2.12	5,525,000	11,139,000	0.76	1.53	7,937,000	16,002,000
1975	54.2	2,680,000	4,945,000	1.04	1.94	3,128,000	5,771,000	0.77	1.42	5,808,000	10,716,000
1976	57.0	3,410,000	5,982,000	1.77	3.11	11,458,000	20,102,000	1.26	2.21	14,868,000	26,084,000
1977	60.0	7,938,000	13,164,000	2.17	3.60	3,546,000	5,881,000	1.34	2.22	11,484,000	19,045,000
1978	64.7	3,584,000	5,539,000	1.89	2.92	3,756,000	5,805,000	1.35	2.09	7,340,000	11,345,000
1979	70.3	6,639,000	9,444,000	2.57	3.66	10,350,000	14,723,000	2.26	3.21	16,988,000	24,166,000
1980	77.1	5,259,000	6,821,000	2.42	3.14	2,926,000	3,795,000	1.34	1.74	8,185,000	10,616,000
1981	84.4	4,039,000	4,786,000	2.57	3.05	5,534,000	6,557,000	1.66	1.97	9,570,000	11,342,000
1982	89.5	6,094,000	6,809,000	2.59	2.89	3,801,000	4,247,000	1.40	1.56	9,895,000	11,056,000
1983 ^{c/}	92.9	1,244,000	1,339,000	1.90	2.05	1,052,000	1,132,000	0.96	1.03	2,296,000	2,471,000
1984 ^{c/}	96.8	1,477,000	1,526,000	2.74	2.83	118,000	122,000	1.66	1.71	1,595,000	1,648,000
1985 ^{c/}	100.0	5,044,000	5,044,000	2.48	2.48	729,000	729,000	1.51	1.51	5,940,000 ^{d/}	5,940,000 ^{d/}

a/ Dressed weight.

b/ Expressed in 1985 dollars.

c/ Preliminary.

d/ Includes pink landings with an ex-vessel value of \$168,000. Nominal pink price per pound was \$0.65.

Table IV-8. Estimates of ex-vessel value^{a/} (in dollars) of Washington non-Indian troll landings and average price (dollars/lb.), 1971-1985.

Year	GNP	Chinook				Coho				Total	
	Price Deflator	Nominal Value	Real ^{b/} Value	Nominal Price/lb.	Real ^{b/} Price/lb.	Nominal Value	Real ^{b/} Value	Nominal Price/lb.	Real ^{b/} Price/lb.	Nominal Value	Real ^{b/} Value
1971	41.4	\$1,654,000	\$ 3,995,000	\$0.62	\$1.49	\$2,477,000	\$ 5,911,000	\$0.36	\$0.87	\$ 4,131,000	\$ 9,978,000
1972	43.2	1,709,000	3,956,000	0.76	1.76	1,959,000	4,535,000	0.58	1.34	3,668,000	8,491,000
1973	45.6	3,480,000	7,219,000	1.05	2.30	3,112,000	6,825,000	0.83	1.82	6,592,000	14,456,000
1974	49.6	3,794,000	7,649,000	1.00	2.02	4,272,000	8,613,000	0.76	1.53	8,066,000	16,262,000
1975	54.2	2,935,000	5,415,000	1.02	1.88	3,481,000	6,423,000	0.79	1.46	6,416,000	11,838,000
1976	57.0	6,034,000	10,586,000	1.59	2.79	7,790,000	13,667,000	1.25	2.19	13,824,000	24,253,000
1977	60.3	6,170,000	10,232,000	2.17	3.60	4,770,000	7,910,000	1.28	2.12	10,940,000	18,143,000
1978	64.7	4,872,000	7,530,000	2.35	3.63	5,153,000	7,964,000	1.84	2.84	10,025,000	15,495,000
1979	70.3	5,501,000	7,825,000	3.24	4.61	9,590,000	13,642,000	2.40	3.41	15,091,000	21,467,000
1980	77.1	3,989,000	5,174,000	2.62	3.40	3,125,000	4,053,000	1.59	2.06	7,114,000	9,227,000
1981	84.4	3,279,000	3,885,000	2.66	3.15	2,642,000	3,130,000	1.52	1.80	5,921,000	7,015,000
1982	89.5	4,246,000	4,744,000	2.57	2.87	2,484,000	2,775,000	1.34	1.50	6,730,000	7,520,000
1983 ^{c/}	92.9	1,152,000	1,240,000	1.72	1.85	313,000	337,000	0.93	1.00	1,465,000	1,577,000
1984 ^{c/}	96.8	255,000	263,000	2.78	2.87	155,000	160,000	1.48	1.53	410,000	424,000
1985 ^{c/}	100.0	837,000	837,000	2.57	2.57	764,000	764,000	1.32	1.32	1,909,000 ^{d/}	1,909,000 ^{d/}

a/ Dressed weight.

b/ Expressed in 1985 dollars.

c/ Preliminary.

d/ Includes pink landings with an ex-vessel value of \$308,000. Nominal pink price per pound was \$0.55.

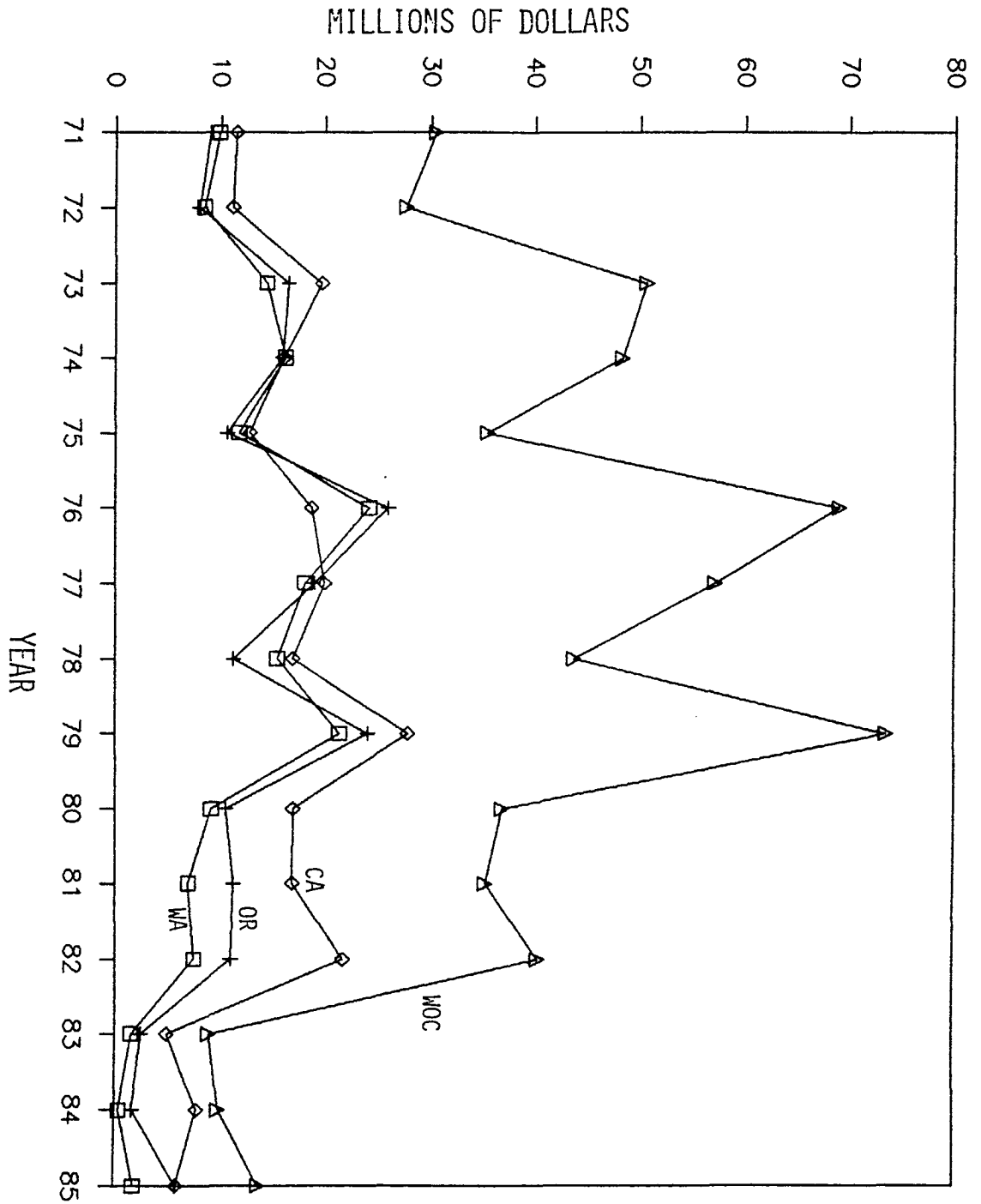


Figure IV-1. Ex-vessel value of troll landings (1985 dollars).

Season average dressed weights for chinook landed in the non-Indian troll fishery increased 11 percent compared to 1984. Average coho dressed weights were similar to 1984 (4.6 pounds), 18 percent less than the 1971-1975 average (Table D-3 in Appendix D).

Columbia River Fishery

Events in the ocean troll fishery impact inriver fisheries in terms of increased or decreased fishing opportunity. Information is presented below and in Table IV-9 on the ex-vessel value of inriver harvest of Columbia River chinook and coho in 1985.

Ex-vessel Prices

Ex-vessel prices for inriver gillnet catches of chinook vary considerably with race (spring versus fall chinook) and stock (tules versus brights). During 1985, spring chinook sold for approximately \$2.80 per pound. Prices for fall brights ranged from \$1.06 to \$1.35 per pound while tules brought an ex-vessel price per pound of \$0.32. The average gillnet chinook price per pound was \$1.30 in Oregon and \$1.17 in Washington. Gillnet coho received an average price over the season of \$0.84 per pound in Oregon and \$0.80 in Washington.

The Indian commercial setnet fishery for chinook and coho occurred only in the fall of 1985 and prices tended to be slightly less than for the non-treaty gillnet fisheries. Season average prices for chinook were \$0.92 per pound and \$0.88 per pound for Oregon and Washington, respectively. Setnet coho ex-vessel prices averaged \$0.68 per pound in Oregon and \$0.77 per pound in Washington.

Ex-vessel Value

The total ex-vessel value for chinook and coho harvested in the Columbia River during 1985 was \$3,747,300, approximately equal to that of 1984. The total value of chinook landed was \$2,413,400, up 5 percent from 1984. Coho ex-vessel value landed was \$1,333,900, a decrease of 21 percent compared to 1984.

Oregon - Ex-vessel value landed by the gillnet fishery (non-Indian) was approximately 98 percent and 78 percent of that in 1984 for chinook and coho, respectively. The combined setnet and dipnet (Indian) harvest was valued at \$661,100 for chinook and \$12,100 for coho, a 78 percent and 79 percent increase over 1984.

Washington - Gillnet landings in Washington were reported at a value of \$531,100 for chinook and \$271,500 for coho, decreases of 6 and 36 percent from 1984, respectively. Setnet harvests of chinook showed an increase in ex-vessel value of approximately 3 percent while coho ex-vessel value increased by 85 percent.

Table IV-9. Ex-vessel values of inriver harvest of Columbia River chinook and coho, 1983-1985.

Year	State	Gear Type	Chinook		Coho		Total
			Average Price/lb.	Ex-vessel Value	Average Price/lb.	Ex-vessel Value	Ex-vessel Value
1983	OR	Gillnet	\$1.35 ^{a/}	\$ 488,000	\$1.06	\$ 39,000	\$ 527,000
		Setnet	0.86	145,000	0.65	350	145,350
		Dipnet	0.54	650	0.46	c/	650
		Total		\$ 634,000		\$ 39,350	\$ 673,000
	WA	Gillnet	1.18	322,000	1.14	\$ 11,000	\$ 333,000
		Setnet	0.87	210,000	NA	240 ^{b/}	210,240
Total			\$ 532,000		\$ 11,240	\$ 543,000	
Grand Total		All		\$1,166,000		\$ 52,200	\$1,217,000
1984	OR	Gillnet	1.44	\$ 999,000	1.15	\$1,257,000	\$2,256,000
		Setnet	1.21	516,000	0.95	3,000	519,000
		Dipnet	0.83	4,200	1.00	730	4,500
		Total		\$1,517,000		\$1,264,000	\$2,781,000
	WA	Gillnet	1.43	\$ 568,000	1.20	\$ 423,000	\$ 991,000
		Setnet	1.26	201,000	NA	2,000 ^{b/}	203,000
Total			\$ 769,000		\$ 425,000	\$1,194,000	
Grand Total		All		\$2,286,000		\$1,689,000	\$3,975,000
1985	OR	Gillnet	1.30	\$1,014,000	0.84	\$1,046,600	\$2,060,600
		Setnet	0.92	660,600	0.68	12,100	672,700
		Dipnet	0.30	500		c/	500
		Total		\$1,675,100		\$1,058,700	\$2,733,800
	WA	Gillnet	1.17	\$ 531,100	0.80	\$ 271,500	\$ 802,600
		Setnet	0.88	207,200	0.77	3,700	210,900
Total			\$ 738,300		\$ 275,200	\$1,013,500	
Grand Total				\$2,413,400		\$1,333,900	\$3,747,300

a/ This represents an average annual price. Prices vary considerably throughout the season and between stocks (tules and brights). During 1985 spring chinook sold for approximately \$2.80 per pound, prices for fall brights ranged from \$1.06 to \$1.35 per pound, and tules received an ex-vessel price per pound of \$0.32.

b/ Average coho setnet prices were unavailable for Washington. These values were calculated using Oregon average coho setnet prices.

c/ Less than \$50.

Trends in Ocean Troll Effort

Total Effort Employed in the Fishery

While the number of vessels participating increased over that during the highly restrictive 1984 fishery in Oregon and Washington, the general declining trend observed during the 1980s has continued. The total number of vessels making landings in each state were as follows: California, 2,308 vessels; Oregon, 2,050 vessels; and Washington, 1,259 vessels. Tables D-4, D-5, and D-6 in Appendix D show trends in total fleet size in recent years. Total days fished by the non-Indian commercial troll fleets were also lower than most years for which estimates are available before 1983.

Progress of State Buy-Back Programs

Washington state has been conducting a buy-back program which includes troll and charter boat vessels. This program was described in some detail in section IV of the "Review of the 1983 Ocean Salmon Fisheries" (March 1984). Two options are available under this program.

1. Thirty percent option.

The state purchases all the current licenses on the vessel and then pays 30 percent of the fair market value of the vessel to the owner. The owner retains the vessel but cannot resume fishing in the Washington salmon fishery for a period of 10 years. He may, however, participate in some other Washington state fishery or move his vessel to another state to fish. If, after the 10-year waiting period, the owner wishes to resume fishing for salmon in Washington, he may do so by purchasing a salmon license on the open market.

2. License-only option.

The state purchases the salmon license under this option while no money is received for the vessel itself.

As of 1985, 82 30-percent-option applications have been purchased and 502 licenses have been purchased under the license-only option from the troll fleet. Thirty-one charter boat operators have sold back their permits under the 30-percent option while 16 permits have been purchased under the license-only option. Table IV-10 outlines the progress of the buy-back program with respect to the ocean troll and charter boat fleets.

Landing By Vessel Size Class

California, Oregon, and Washington landings data (in pounds) by vessel size class are shown in Appendix D, Tables D-7, D-8, and D-9. In addition, an approximation of ex-vessel value by vessel size and port of landing is available for California and Washington (Tables IV-11 and IV-12). A combined coho and chinook average price was used to estimate values of landings reported without corresponding value data. Therefore, the total values may not be precise.

Table IV-10. Troll and charter boat participation in Washington state's buy-back program.

	Number of Vessels in Fleet				Licenses Purchased Under: ^{a/}		Applications Remaining	
	1975	1981	1984	1985 ^{a/}	30% Option	License-only Option	30% Option	License-only Option
Trollers	3,030 ^{b/}	2,603 ^{b/}	1,907 ^{b/}	1,673 ^{b/}	82	502	74	0
Charter Boat Operators	404	478	319	302	61	26	31	16

a/ As of January 1986.

b/ Includes trollers with vessel delivery permits.

Table IV-11. Landings and ex-vessel values by vessel size categories for selected California ports, 1985.

Port	Vessel Length (feet)	Number of Deliveries	Total Pounds Landed	Total Ex-vessel Value	% total Ex-vessel Value landed in Port
Crescent City	<26	-	-	-	-
	26-36	8	1,330	2,983	8
	>36	23	18,603	33,910	92
	Unknown	-	-	-	-
Trinidad	<26	-	-	-	-
	26-36	3	447	1,016	100
	>36	-	-	-	-
	Unknown	-	-	-	-
Eureka	<26	4	247	464	0
	26-36	36	8,219	19,186	17
	>36	89	38,666	92,641	83
	Unknown	-	-	-	-
Fort Bragg	<26	2,796	113,315	271,056	8
	26-36	3,485	516,426	1,245,801	35
	>36	2,299	828,470	2,004,415	57
	Unknown	19	1,864	4,425	0
Shelter Cove	<26	1,943	161,361	385,055	43
	26-36	377	69,369	156,597	17
	>36	615	155,761	362,767	40
	Unknown	2	420	868	0
Mendocino	<26	762	43,061	104,309	50
	26-36	446	34,703	82,957	40
	>36	64	8,487	19,991	10
	Unknown	-	-	-	-
Bodega Bay	<26	2,362	152,892	383,914	13
	26-36	3,761	430,726	1,072,902	36
	>36	2,662	611,942	1,537,525	51
	Unknown	10	1,925	4,771	0
San Francisco	<26	610	39,193	104,913	7
	26-36	945	125,739	324,252	23
	>36	1,044	391,943	989,391	69
	Unknown	9	3,959	10,535	1
Half Moon Bay	<26	908	63,061	170,009	17
	26-36	921	95,944	256,060	25
	>36	768	222,854	590,817	58
	Unknown	6	377	977	0
Santa Cruz	>26	642	31,988	88,424	24
	26-36	483	45,682	125,721	33
	>36	204	55,685	154,862	41
	Unknown	6	2,037	6,313	2
Moss Landing	<26	383	13,944	37,235	8
	26-36	664	44,934	122,590	26
	>36	404	141,681	309,264	66
	Unknown	1	194	524	0
Monterey	<26	369	15,487	42,392	20
	26-36	490	43,655	127,420	77
	>36	73	14,125	37,735	64
	Unknown	2	128	353	0
Santa Barbara	<26	128	6,718	20,993	10
	26-36	183	10,465	60,646	28
	>36	105	45,274	135,588	62
	Unknown	1	55	193	0
Unknown	<26	13	499	1,440	7
	26-36	35	3,027	5,361	28
	>36	18	3,635	2,291	12
	Unknown	4	7,368	10,230	53

Table IV-12. Landings and ex-vessel values by vessel size categories for selected Washington ports, 1985.

Port	Vessel Length (feet)	Number of Boat Days	Total Pounds Landed	Total Ex-vessel Value	% Total Ex-vessel Value Landed Port
Neah Bay	<26		12,748	\$ 29,844	16.9
	26-35		14,00	27,106	15.3
	>35		51,992	111,674	63.2
	Unknown		3,563	8,096	4.6
Westport	<26		64,844	108,317	15.3
	26-35		92,088	149,008	21.1
	<35		262,716	446,497	63.2
	Unknown		1,569	2,470	0.4
Ilwaco	<26		15,176	24,432	14.7
	26-35		14,017	27,225	16.4
	>35		54,120	113,663	68.5
	Unknown		278	551	0.3
Other Ports	<26		99,926	159,562	23.8
	26-35		93,653	156,404	23.3
	>35		181,972	351,593	52.4
	Unknown		1,781	2,729	0.4

While total fleet size was down in California and the area north of Shelter Cove was closed to commercial salmon fishing, the distribution of effort by vessel size category remained relatively constant. The 36 to 40 foot vessel size category continued to harvest the greatest percentage of the total catch while the 51 to 55 foot class had the greatest average catch per boat (see Appendix D, Table D-7). The relative importance of different size categories for a given port of landing varies by port as is illustrated in Tables IV-11.

In Oregon, the composition of the fleet in terms of vessel size categories more closely resembled that observed from 1978 through 1983 than the 1984 fleet composition. Over 50 percent of the fleet in 1985 was under 30 feet in length compared to 41 percent in 1984 and a range of 53 to 56.1 percent during 1978 to 1983. Eighty-three percent of the total poundage landed in 1985 was harvested by vessels over 30 feet in length. This compares to 80 percent in 1984 and an average of 71 percent during 1978-1984.

A similar pattern of fleet composition and harvest by size categories was seen in Washington as in Oregon. Vessels greater than 30 feet in length comprised 44 percent of the fleet and landed 75 percent of the catch. Table IV-12 presents information on vessel size class landings by port.

More Productive Segments of the Fleet

Tables D-10, D-11, and D-12 in Appendix D present the number of vessels landing 50 percent and 90 percent of the total Oregon and Washington troll catch each year for all salmon species combined for California, Oregon, and Washington.

In California, 10.4 percent of the fleet (241 vessels) harvested 50 percent of the salmon landed and 38.9 percent (898 vessels) were responsible for landing 90 percent of the total catch compared to averages of 9.7 percent and 38.2 percent, respectively, from 1978-1984.

Similarly, Oregon data shows that a small segment of the fleet land most of the total Oregon troll catch. This trend was even more pronounced in 1985 when 6.5 percent of the fleet (133 vessels) caught 50 percent of the total harvest and 25.1 percent of the fleet (514 vessels) caught 90 percent of the total harvest. In other words, most of the troll fleet land very few fish, while a small group of fishermen is very productive.

For Washington, the percentage of the fleet that harvested 50 and 90 percent of the catch was similar to those observed from 1978 to 1982. In 1985, 8.3 percent of the fleet (104 vessels) harvested 50 percent of the catch while 35.2 percent (443 vessels) harvested 90 percent.

It should be noted that these data are for individual state landings only. Some vessels spread their landings over two or more states; their individual state landings, therefore, may be relatively low.

Mobility Patterns

Tables IV-13 through IV-15 present preliminary data on the home state of trollers that landed salmon in California, Oregon, and Washington in 1985. Tables D-13 through D-17 in Appendix D show trends in participation by

Table IV-13. California troll fleet by home state and salmon landings, 1985.^{a/}

Home State	Number	Percent	Landings		Total	
			Pounds	Percent	Value	Percent
California	2,130	92.2	4,182,782	90.3	10,401,987	90.3
Oregon	95	4.1	307,166	6.6	765,150	6.6
Washington	24	1.0	33,822	0.7	81,775	0.7
Unknown/Other	<u>59</u>	2.6	<u>105,958</u>	2.2	<u>266,037</u>	2.3
Total	2,308		4,629,731		11,514,996	

a/ Preliminary.

Table IV-14. Oregon troll fleet by home state and salmon landings, 1985.^{a/}

Home State	Number	Percent	Landings (lbs.)	Percent
Oregon	1,778	86.8	2,031,539	73.3
California	82	4.0	309,628	11.2
Washington	165	8.1	413,838	14.9
Unknown/Other	<u>23</u>	1.1	<u>17,316</u>	0.6
Total	2,048		2,772,321	

a/ Preliminary.

Table IV-15. Washington troll fleet by home state and landings, 1985.^{a/}

Home State	Number	Percent	Landings (lbs.)	Percent
Washington	1,167	92.7	926,608	96.3
Oregon	42	3.3	17,866	1.9
California	3	0.2	342	0
Alaska	2	0.2	1,123	0.1
Other/Unknown	<u>45</u>	3.6	<u>16,504</u>	1.2
Total	1,214		962,443	

a/ Preliminary.

out-of-state vessels in each state from 1977 or 1978 to the present. These data give some indication of the degree of coastwide mobility of the ocean troll fleet. In general, the overwhelming harvest occurring off the coast of each state is landed by residents of that state.

In 1985, the entire California troll fishery occurred south of Point Delgada. The percentage of out-of-state vessels in this area was approximately 4 percent, similar to statewide percentages for the fleet for the period 1978-1984 excluding 1983 when it increased to 9 percent. While the percentages remained the same, the number of out-of-state vessels decreased possibly due to increased fishing opportunities in Oregon and Washington.

In Oregon, the percentage of the fleet comprised of local vessels was similar to 1984 (86.8 percent compared to 85.2). However, out-of-state vessels accounted for a greater percentage of the total Oregon landings in 1985 (26.7 percent compared to 20.4 percent in 1984). California vessels made up 4 percent of the fleet and landed 11.2 percent of the total catch, compared to 2.9 percent of the fleet and 2.3 percent of the landings in 1984.

Washington's troll fleet has had both the most restrictive seasons and the smallest percentage of out-of-state vessels on the west coast in recent years. During 1985, out-of-state participation of the total fleet landing in Washington was 7.3 percent compared to 5.2 percent in 1984. These out-of-state vessels harvested approximately 3.7 percent of the total catch in 1985 compared to 5 percent in 1984.

Participation in Other Fisheries

West coast salmon trollers have commonly participated in other fisheries, particularly the albacore and crab fisheries. More recently, an increasing number of trollers are supplementing their troll fishery with longlining for halibut and/or rockfish. Conditions in these fisheries can impact effort patterns in the ocean salmon troll fishery and vice versa.

Albacore - During 1985, low prices at commercial buying stations have discouraged many vessels from participating in the Washington albacore fishery, while other fishermen have elected to retail their catch directly to the public. While landings were above 1984 record low, they were still far below the 25 year average.

The majority of the Oregon albacore fishery took place approximately 100 to 200 miles off shore, out of range of most vessels without freezing capability. The preliminary season landings total 966,000 pounds, a 31 percent decrease from 1984 and 11,947,565 pounds below the 25-year average.

California albacore landings decreased over 1984 levels. In 1985, an estimated 14,370,000 pounds were landed, 8,165,000 pounds less than in 1984. The majority of this catch was landed in southern California. Some fish were caught within 6 to 80 miles off shore from Morro Bay, Monterey, and San Francisco.

Crab - Harvest of crab in Washington, Oregon, and California for the 1984-1985 season was 12.45 million pounds. By state, harvests were as follows: Washington, 2.9 million pounds; Oregon, 4.8 million pounds; and California, 4.5 million pounds. Average prices per pound in 1984-1985 began at \$1.25, rose to \$1.75 around Christmas and then dropped to \$1.50 in late June.

Halibut - Total landings in the Washington, Oregon, and California area were 500,000 pounds, an increase of 125,000 pounds over 1984.

Groundfish - Total landings of groundfish by vessels using longline, pot, jig, and troll gear during 1985 were as follows: California, 1,037 mt; Oregon, 2,923 mt; and Washington, 4,318 mt. The ex-vessel value reported for these landings were \$5,695,000 in Washington; \$2,387,000 in Oregon; and \$2,465,000 in California.

Treaty Indians

The 1981 through 1983 salmon plan amendments give a brief description of coastal Indian fishing communities in Washington, the types of salmon fisheries coastal tribes participate in, and recent changes in number of treaty fishing days. Information on effort levels (number of deliveries) and catch statistics are presented in section one. Table IV-16 gives an indication of the number of treaty Indian vessels licensed for ocean troll fisheries. In 1985, a total of 93 vessels made landings of troll-caught salmon. Of the 30 licensed Makah trip boats, 15 participated in the troll fishery.

Assessment of 1985 Ocean Recreational Fishery

Recreational salmon fishing takes place primarily in one of two modes: anglers fishing from privately owned pleasure craft and anglers employing the services of the charter boat fleet. Tables IV-17, IV-18, and IV-19 present the ocean recreational catch and effort by boat type for recent years.

California

Recreational fishing from privately owned pleasure vessels takes place along the California coast primarily north of Monterey. Charter boat angling occurs principally out of San Francisco Bay, although there was an increase in charter boat angler trips north of Point Delgada during 1985.

In 1985, 47 percent of salmon angler trips were taken by anglers on charter boats (Table IV-17). The total number of charter boat salmon angler trips taken was 87,900, approximately a 53 percent increase over 1984.

Effort by skiff (individually owned recreational vessels) fishermen increased 48 percent compared to 1984 and was 15 percent greater than the 1976-1984 average. There was a major increase in sport fishing activity north of Point Delgada. Eureka effort of 33,700 angler days was the highest effort level since 1976 and was 84 percent of the 1971-1975 average. Crescent City landings were the highest since 1976 and were 217 percent of the 1971-1975 average. The high chinook salmon success rates in these fisheries beginning

Table IV-16. Number of licensed treaty Indian ocean salmon vessels, 1977-1985.

Year	Total Treaty	Quinault Tribe		Quileute Tribe	Makah Tribe	
	Troll Vessels	Trip Boats	Day Boats	All vessels ^{a/}	Trip Boats ^{b/}	Day Boats
1977	39	NA	NA	NA	NA	NA
1978	56	NA	NA	NA	NA	NA
1979	75	NA	NA	NA	NA	NA
1980	69	3	5	8	NA	NA
1981	81	3	10	11	14	16
1982	110	3	7	11	25	32
1983	NA	3	7	11	29	32
1984	NA	1	20 ^{c/}	5 ^{d/}	33	31
1985		2	28 ^{c/}	13 ^{e/}	30 ^{f/}	35

a/ Most of these vessels are trip boats.

b/ Approximately 50 percent of Makah trip boats are combination vessels.

c/ These were largely skiffs which made only one delivery each during the season.

d/ In 1984, 2 vessels were trip boats and 3 were day boats.

e/ In 1985, 6 vessels were trip boats and 7 were day boats.

f/ Fifteen vessels participated in the troll fishery.

Table IV-17. California ocean recreational catch (thousands of fish) and effort (thousands of angler trips) by boat type, 1976-1985 with 1971-1975 average.

Year	Angler Trips		Chinook Catch		Coho Catch	
	Charter	Skiff	Charter	Skiff	Charter	Skiff
1971-1975 Average	102.5	139.3	105.5	64.1	12.2	36.1
1976	75.2	107.0	50.6	30.4	15.3	42.6
1977	80.5	101.7	54.6	49.4	2.4	11.8
1978	52.8	103.0	42.0	34.1	3.6	41.0
1979	78.6	85.0	71.8	40.6	2.0	14.5
1980	69.2	79.2	62.9	22.5	1.7	20.4
1981 ^{a/}	61.1 ^{b/}	66.9	59.5 ^{b/}	24.2	0.2 ^{b/}	9.5
1982 ^{a/}	80.3 ^{b/}	90.1	102.0 ^{b/}	47.2	1.6 ^{b/}	22.8
1983 ^{a/}	46.2 ^{b/}	65.4	44.8 ^{b/}	17.3	0.2 ^{b/}	26.7
1984 ^{a/}	57.6 ^{b/}	66.0	69.7 ^{b/}	19.6	0.2 ^{b/}	18.2
1985 ^{a/}	87.9	97.7	96.8	63.8	0.9	14.4

a/ Preliminary.

b/ Includes San Francisco area charter boats only.

Table IV-18. Oregon ocean recreational catch (numbers of fish) and effort (angler trips) by boat type, 1979-1985.^{a/}

Year	Angler Trips		Chinook Catch		Coho Catch	
	Charter	Pleasure	Charter	Pleasure	Charter	Pleasure
1979	73,700	187,700	5,400	13,300	59,800	101,800
1980	79,000	218,900	5,100	11,900	98,300	207,500
1981	65,400	242,600	6,600	22,200	64,500	135,300
1982	43,300	182,700	8,200	30,600	48,500	126,700
1983	41,900	184,100	4,700	20,000	39,700	107,200
1984 ^{b/}	24,300	128,700	2,200	14,800	27,300	96,100
1985 ^{b/}	53,400	198,200	9,200	46,600	60,200	122,800
1979-1984 Average	54,600	190,783	5,367	18,800	56,400	129,100

a/ Salmon data from surveyed ports only. For 1979-1980 this includes: Astoria, Garibaldi, Depoe Bay, Newport, Winchester Bay, Coos Bay, Gold Beach, and Brookings. In 1981-1984, Pacific City and Florence were also surveyed.

b/ Preliminary.

Table IV-19. Washington ocean recreational salmon catch (numbers of fish) and effort (angler trips by boat type), 1979-1985.^{a/}

Year	Angler Trips		Chinook		Coho		Pink	
	Charter	Private	Charter	Private	Charter	Private	Charter	Private
1979	220,800	89,800	61,100	15,700	227,900	62,400	9,400	8,300
1980	193,900	86,200	41,100	12,500	288,400	73,100	100	-
1981	162,200	74,600	62,800	21,700	182,400	55,500	4,600	5,600
1982 ^{b/}	131,900	86,800	85,800	21,000	124,000	82,500	-	-
1983 ^{b/}	123,000	90,400	39,100	9,500	122,600	89,200	700	3,800
1984 ^{b/c/}	29,786	46,878	7,672	7,398	38,491	49,574	-	-
1979-1985 Average	130,800	72,600	44,100	13,800	152,100	66,000	4,200	4,700
1985 ^{b/c/}	65,500	62,500	17,400	10,800	98,600	80,300	1,900	1,200

a/ Source: Washington ocean salmon sampling program.

b/ These values include some inriver Columbia River fishing after closure of the ocean fishery.

c/ Preliminary.

in May and continuing through August probably contributed to the high effort levels out of these port. (A similar situation developed in Brookings, just north of Crescent City.)

Oregon

There are 226 registered charter boat vessels in Oregon, a 4 percent increase from 1984. The number of vessels actually fishing in 1985 was 132 (preliminary). Table D-18 in Appendix D shows the number of licensed charter boats from 1980 to the present.

The percent of the total angler trips taken by charter boat fishermen steadily decreased from 28 percent in 1979 to 15 percent in 1984 (Table IV-18). In 1985, the percentage of charter boat angler trips increased to 22 percent. The number of charter boat related angler trips taken were 53,400, a 119 percent increase from 1984 levels and approximately equal to the 1979-1984 average. Charter boat fishermen harvested 16 and 33 percent of the chinook and coho caught off Oregon, respectively. Total number of private pleasure craft angler trips (198,200) also increased, up 54 percent and 4 percent from the 1984 and 1979-1984 average, respectively.

For the area north of Cape Falcon, salmon fishing occurred between Sunday and Thursday only. This measure assisted in spreading the season out over a longer period than would have been possible otherwise. In the Columbia River area, charter boat angler trips increased 207 percent while private boat angler trips in the same area increased 165 percent. At the same time, bottom fishing trips also increased, with 88 charter boat angler trips and 43 private boat angler trips occurring in 1985 compared with 23 and 3 trips, respectively, in 1984.

Washington

The Friday and Saturday closure also was in effect for the ocean recreational fishery off Washington. This regulation allowed a longer total season length than would have occurred otherwise. Charter boat operators in Westport reported an increase in bottom fishing trips on the days when salmon fishing opportunities were not available.

Table IV-19 presents ocean recreational catch and effort data for 1979 to the present. During 1984, approximately 51 percent of the total ocean angler trips were taken on charter boats. The total number of charter boat angler trips (65,455) was 358 and 50 percent of the 1984 and 1979-1985 average, respectively. The number of angler trips taken from private pleasure craft was 2.47 times greater than in 1984 and 86 percent that of the 1979-1985 average.

Buoy 10 Fishery

As in 1984, a fishery took place in the vicinity of Buoy 10. The season length of the Buoy 10 fishery was less than 1984, totaling 27 days compared to 53 days in 1985. During the total Buoy 10 fishery, 17,767 salmon angler trips occurred with a harvest of 2,425 chinook; 16,075 coho; and 11 pink salmon.

Community Impacts of the 1985 Ocean Troll and Recreational Fisheries on Coastal Communities

In many coastal towns in northern California, Oregon, and Washington where lumber, fishing, and tourism are the major industries; ocean commercial and recreational salmon fishing contribute significantly to local economies.

The amount that a commercial fisherman spends in order to harvest fish, that the processor spends to prepare a consumer-ready product for market, or that a recreationalist spends to take part in ocean fishing has an important impact on the local and regional economy. In addition, purchases made by the harvester, processor, or tourist-related businesses will cause suppliers to purchase additional inputs in the form of labor, more inventory, and other items. As workers and entrepreneurs receive wages, salaries, and profits from these activities, they spend money in the local area for a variety of goods and services. The total effect on the local economy depends upon the amount of the original dollar and the amount which is spent for subsequent purchases within the local economy. This effect is closely tied to the total amount of expenditures, the types of expenditures, and the structure of the local economy.

Input/Output Models

Economic input/output (I/O) models are often used to estimate the impact of resource changes or to calculate the contributions of an industry to the local economy. The basic premise of the input/output framework is that each industry sells its output to other industries and final consumers who, in turn, purchases goods and services from other industries and primary factors of production. Therefore, the economic contribution of each industry to the local economy can be determined by changes in both final demand and the specific interindustry relationships.

I/O models can be constructed using surveys of a regional economy. The disadvantages of a survey model approach are due to its complexity and high cost. Construction of a survey data I/O model involves obtaining data on the sectoral distribution of local purchases and sales to final demand of every sector of the economy, and on the imports purchased and exports sold by each sector. Another approach uses secondary data to construct estimates of local economic activity. For a review of the advantages and disadvantages of survey versus secondary data I/O models, see Radtke, et al.^{1/}

The model used to estimate impacts for the ocean salmon fishery for 1984 and 1985 utilizes one of the best known secondary I/O models available. The U.S. Forest Service has developed a computer program called IMPLAN which can be used to construct county or multi-county I/O models for any region in the U.S. The regional I/O models used by the Forest Service are derived from

1/ Radtke, Hans, Stan Detering, and Ray Broken, "A Comparison of Economic Impact Estimates for Changes in the Federal Grazing Fee: Secondary vs. Primary Data I/O Models." Paper to be published in the Western Journal of Agriculture Economics, December 1985.

technical coefficients of a national I/O model and localized estimates of total gross outputs by sectors.^{2/} The computer program (IMPLAN) adjusts the national level data to fit the economic composition and estimated trade balance of a chosen region.

Sales and Local Income Multipliers

A common misuse of I/O analysis is in the application of sales and local income multipliers. A discussion of the methods for calculating output multipliers and income coefficients is included in Appendix E. Readers are encouraged to review this discussion in order to correctly interpret the information provided below.

Fisheries Economic Assessment Model for Communities on the West Coast

I/O models have been constructed for many of the Pacific coast communities that are dependent on commercial and recreational fishing.

Representative budgets from the fish harvesting and processing sectors and impact assessment models are taken from studies developed by Radtke and Jensen.^{3/} The budgets used in these reports reflect the expenditure patterns of the salmon fishermen that harvest the majority of the fish. These expenditures determine the economic impacts that the commercial fishery has on the community. However, other factors such as the size of the community, the inventory of the fleet, and the number and type of processors in the area will also affect the size of the impacts. For example, to derive the impact of an average harvest, the computer model run used an annual landed poundage equal to the average of the 1976-1985 years. On a per pound basis, an average chinook landed and processed in a local coastal community could be expected to generate about \$5.10 per pound in 1985 dollars. A coho would generate about \$3.05 per pound, and a pink salmon about \$1.35 per pound. Care should be taken in using these averages, since communities will have different response coefficients and therefore different impacts per pound harvested and processed. The larger communities of California, for example, will have larger impacts per pound because the expenditures that are initiated by the fishing industry will have smaller leakages. These concepts are explained in Appendix E.

2/ Siverts, Eric, Charles Palmer, and Ken Walters. IMPLAN Users' Guide. U.S. Forest Service, Fort Collins, Colorado, September 1983.

3/ Radtke, Hans and William Jensen. "Fisheries Economic Assessment Model" West Coast Fisheries Development Foundation, 1985. (Funded by the S-K program through NMFS) and "Commercial Salmon Fishery Economic Assessment Model" Prepared for the National Marine Fisheries Service and Small Business Administration, 1985.

Similarly, budgets for recreational charter boats and recreational private boat fishermen developed by Crutchfield and Schelle^{4/} are used to estimate the community impacts of the recreational ocean fishery.^{5/} The procedure used is outlined in an ODFW report on ocean salmon fisheries.

Using Crutchfield and Schelle's information, expenditures for charter boat patrons of \$60.61 per day in 1984 were calculated. For private boat users these expenditures were \$45.92. The impacts per day, that resulted from these expenditures, vary a great deal in each coastal community depending on the distribution of catch between private and charter boats and the size of the coastal community. The average impact per recreational ocean salmon fishing day, in 1985 dollars with 1976-1985 reported recreational days, ranges from \$43.89 on the Oregon coast to \$61.96 on the California coast.

The estimated impacts of commercial and recreational salmon fishing for communities in Washington, Oregon, and California are shown in Tables IV-20, IV-21, and IV-22. The impacts presented are in terms of changes in total personal income generated in an area. While I/O analysis can provide information concerning the distribution of these impacts among various sectors of the local economy, (see section on sectoral analysis), it cannot describe the personal losses which occur as a result of individual businesses going bankrupt, foreclosures occurring, etc.

Commercial Ocean Troll Landings and Ocean Recreational Fishing Impacts by Areas on the West Coast

For both the commercial and recreational fishery, 1985 was generally an improvement over 1984. Exceptions were commercial fishery sector impacts on the northern coast of California (Eureka-Crescent City areas). The most dramatic increases in terms of estimated community income, were in the Coos Bay, Oregon and Fort Bragg, California areas. These estimates are based on the landings in the area and the inventory of fleet and processors. Because the fishing fleet is fairly mobile, the impacts for some specific areas may be overestimated.

California

The total pounds of troll-caught salmon landed in California increased by 64 percent between 1984 and 1985. The increase came mostly from chinook landings since the coho troll landings decreased from 348,417 pounds in 1984 to 81,154 pounds in 1985. The total pounds landed in 1985 were 71 percent of the 1976-1985 average. Total ocean salmon recreational fishing days increased from 123,100 to 185,500 days, which was 120 percent of the 1976-1985

4/ Crutchfield and Schelle, "An Economic Analysis of Washington Ocean Recreational Salmon Fishing With Particular Emphasis on the Role Played by the Charter Vessel Industry," 1978.

5/ "Progress Report on the Economic Aspects of the Recreational/Commercial Allocation of Coho Salmon in the Ocean Fisheries." Oregon Department of Fish and Wildlife, Portland, Oregon 1985.

Table IV-20. Local personal income impacts of commercial and recreational ocean salmon fishery for major California areas, 1984, 1985, and annual average for years 1976-1985.

Area	Fishery/Species	Pounds or Days			Local Personal Income Impact in Dollars		
		1976-1985 ^{a/b/} Average	1984	1985	1976-1985 ^{a/b/} Average	1984	1985
Crescent City	<u>Ocean Troll</u>				3,118,815	885,667	49,367
	Chinook	379,470	113,610	13,363			
	Coho	260,426	19,049	2,888			
	Pink		0	3,617			
	<u>Recreational</u>				1,091,574	1,102,104	1,528,692
	Angler Days	22,350	23,400	31,300			
Eureka	<u>Ocean Troll</u>				7,820,856	793,908	252,231
	Chinook	937,992	110,805	44,903			
	Coho	328,719	24,875	2,408			
	Pink		0	272			
	<u>Recreational</u>				1,318,346	972,058	1,908,431
	Angler Days	23,280	17,800	33,700			
Fort Bragg	<u>Ocean Troll</u>				8,986,592	3,457,746	11,522,147
	Chinook	1,253,095	445,980	1,840,832			
	Coho	199,836	88,861	66,390			
	Pink		0	29,668			
	<u>Recreational</u>				583,198	197,524	679,140
	Angler Days	10,820	3,800	12,600			
San Francisco	<u>Ocean Troll</u>				13,132,505	12,149,237	15,286,715
	Chinook	1,732,542	1,494,919	2,127,268			
	Coho	89,712	184,780	8,186			
	Pink		0	5,656			
	<u>Recreational</u>				5,940,720	4,232,098	6,210,780
	Angler Days	89,200	65,900	93,300			
Monterey	<u>Ocean Troll</u>				8,352,122	3,115,460	3,598,574
	Chinook	924,238	455,934	479,788			
	Coho	351,120	30,852	1,282			
	Pink		0	493			
	<u>Recreational</u>				633,366	815,594	972,360
	Angler Days	9,510	12,200	14,600			
California Coast	<u>Ocean Troll</u>				41,410,890	20,102,018	30,678,034
Total	Chinook	5,227,337	2,621,248	4,506,154			
	Coho	1,229,813	348,417	81,154			
	Pink		0	39,706			
	<u>Recreational</u>				9,567,204	7,319,378	11,302,403
	Angler Days	154,400	123,100	185,500			

a/ Pinks not included.

b/ In 1985 dollars.

Table IV-21. Local personal income impacts of commercial and recreational ocean salmon fishery for major Oregon areas, 1984, 1985, and annual average for years 1976-1985.

Area	Fishery/Species	Pounds or Days			Local Personal Income Impact in Dollars		
		1976-1985 ^{a/b/} Average	1984	1985	1976-1985 ^{a/b/} Average	1984	1985
Astoria	<u>Ocean Troll</u>				1,500,042	272,726	950,112
	Chinook	101,977	27,304	69,658			
	Coho	252,201	34,086	149,101			
	Pink		0	11,025			
	<u>Recreational</u>				1,993,859	327,629	956,603
	Angler Days	41,730	7,110	20,021			
Tillamook	<u>Ocean Troll</u>				2,145,718	157,511	325,386
	Chinook	84,835	17,035	37,346			
	Coho	522,742	18,331	35,002			
	Pink		0	29,235			
	<u>Recreational</u>				1,552,236	997,053	1,676,415
	Angler Days	35,700	23,779	38,556			
Newport	<u>Ocean Troll</u>				4,191,450	968,103	2,388,083
	Chinook	362,328	164,012	378,744			
	Coho	798,943	18,627	97,264			
	Pink		0	17,532			
	<u>Recreational</u>				3,194,900	1,823,024	3,033,822
	Angler Days	74,300	43,960	70,554			
Florence	<u>Ocean Troll</u>					89,406	469,606
	Chinook		16,869	71,272			
	Coho		0	20,372			
	Pink		0	5,724			
	<u>Recreational</u>					359,669	591,078
	Angler Days		8,673	13,746			
Reedsport	<u>Ocean Troll</u>					185,765	1,267,416
	Chinook		35,050	198,057			
	Coho		0	44,486			
	Pink		0	19,255			
	<u>Recreational</u>					899,775	1,479,157
	Angler Days		21,697	34,399			
Coos Bay	<u>Ocean Troll</u>				7,694,100 ^{c/}	480,474	7,125,673
	Chinook	732,740 ^{c/}	85,299	1,208,858			
	Coho	1,066,497 ^{c/}	0	136,169			
	Pink		0	174,333			
	<u>Recreational</u>				3,803,682 ^{c/}	432,710	697,009
	Angler Days	83,800 ^{c/}	9,886	15,356			
Brookings	<u>Ocean Troll</u>				789,728	999,259	185,909
	Chinook	562,679	204,095	65,693			
	Coho	227,049	0	1,433			
	Pink		0	1,531			
	<u>Recreational</u>				2,559,060	1,487,402	2,394,590
	Angler Days	63,000	37,973	58,951			
Oregon Coast Total	<u>Ocean Troll</u>				16,321,039	3,153,244	12,712,185
	Chinook	1,844,559	549,664	2,029,628			
	Coho	2,867,432	71,044	483,827			
	Pink		0	258,635			
	<u>Recreational</u>				13,103,737	6,327,259	10,828,671
	Angler Days	298,530	153,078	251,583			

a/ Pinks not included. Florence and Reedsport are included with the Coos Bay area.

b/ Expressed in 1985 dollars.

c/ Florence and Reedsport are included with the Coos Bay area for 1976-1985 average.

Table IV-22. Local personal income impacts of commercial and recreational ocean salmon fishery for major Washington areas, 1984, 1985, and annual average for years 1976-1985.

Area	Fishery/Species	Pounds or Days			Local Personal Income Impact in Dollars		
		1976-1985 ^{a/} Average	1984	1985	1976-1985 ^{a/} Average	1984	1985
Neah Bay/LaPush	<u>Ocean Troll</u>				6,479,305	307,788	1,929,470
	Chinook	327,450	23,500	52,000			
	Coho	773,497	75,150	28,520			
	Pink	1,230,680	0	537,900			
	<u>Recreational</u>				2,635,867	450,969	1,007,475
	Angler Days	49,600	8,800	18,958			
Westport	<u>Ocean Troll</u>				8,827,825	165,825	1,176,178
	Chinook	848,040	55,460	240,600			
	Coho	934,175	0	120,980			
	Pink	123,530	0	15,400			
	<u>Recreational</u>				10,173,150	944,966	3,935,438
	Angler Days	144,300	13,900	55,823			
Ilwaco	<u>Ocean Troll</u>				2,528,985	126,454	441,605
	Chinook	182,040	11,280	70,720			
	Coho	394,955	29,250	65,320			
	Pink	12,100	0	5,500			
	<u>Recreational</u>				4,308,265	566,399	2,229,814
	Angler Days	102,700	14,000	53,149			
Washington Coast Total	<u>Ocean Troll</u>				17,836,115	600,067	3,547,253
	Chinook	1,357,530	90,240	363,320			
	Coho	2,102,627	104,400	214,820			
	Pink	1,366,310	0	558,800			
	<u>Recreational</u>				17,117,159	1,962,334	7,172,727
	Angler Days	296,600	36,800	127,930			

a/ Expressed in 1985 dollars.

average. The resulting increase in community personal income generated by these fishing activities was not distributed evenly throughout the coastal communities in California (Table IV-20). In both the Crescent City and Eureka areas, personal income generated from recreational ocean salmon fishing increased compared to 1984, while the personal income generated as a result of commercial salmon fishing decreased dramatically. The total personal income from recreational and commercial fishing in these areas was 37 percent and 24 percent of the 1976-1985 average for Crescent City and Eureka, respectively. The Fort Bragg area, on the other hand, experienced over a three-fold increase in personal income generated by commercial and recreational ocean salmon fishing compared to 1984, 127 percent of the 1976-1985 average.

Overall, the personal income generated in coastal counties from commercial ocean salmon fishing south of Point Delgada was approximately equal to the 1976-1985 average while personal income generated from fish landed north of Point Delgada was approximately 3 percent of the ten-year average. The 1985 personal income generated from the ocean recreational salmon fishery increased 10 percent, compared to 1984 and was 34 percent over the 1976-1985 average.

Oregon

In terms of total pounds landed, recreational days, and resulting local personal income generated; the Oregon coast as a whole experienced a substantial increase in all categories compared to 1984 but remained below the 1976-1985 average (Table IV-21).

The Brookings area was one exception. While recreational ocean salmon fishing days increased over 1984, the commercial pounds landed in the area decreased substantially because of the Cape Blanco to Point Delgada closure. Personal income resulting from commercial salmon fishing decreased from \$999,259 in 1984 to \$185,909 in 1985. Compared to the 1976-1985 average, the personal income generated decreased 76 percent and 6 percent for the commercial and recreational fisheries, respectively.

The Coos Bay area chinook landings, on the other hand, increased by a factor of 14 from 85,299 to 1,208,858 pounds. The resulting increase in personal income from commercial salmon fishing in the Coos Bay areas was a dramatic increase from \$480,474 in 1984 to \$7,125,673 (or 93 percent of the 1976-1984 average) in 1985.

Washington

The increase in personal income generated by ocean salmon fishing in Washington in 1985 compared to 1984 came mostly from recreational ocean fishing (Table IV-22). Recreational days fished increased from 36,800 in 1984 to 126,930 in 1985. The resulting change in local personal income was an increase of over 4 million dollars, from \$1,962,334 to \$7,171,727. The local personal income generated from commercial landings increased by over 2.9 million dollars, 5.9 times that generated from 1984 landings. However, compared to the 1976-1985 average the local personal income generated decreased by 80 percent and 58 percent for the commercial and recreational salmon fisheries, respectively.

Sectoral Analysis of Impacts

Of interest to local businesses and community leaders is the impact of fish harvesting activities on specific local businesses. Such impacts depend on the expenditures by the type of fishery. The impact of a decrease in commercial landings between 1982 and 1984 was estimated by Radtke and Jensen.^{6/} Because most revenues of the commercial salmon fisherman go directly into the household sector, the general businesses in the local area (retail, wholesale, housing, medical services, etc.) that depend on general purchases are affected as much as are specific businesses serving the local salmon industry.

For example, for every \$1,000,000 loss in income that the Westport, Washington area experienced as a result of the decline in landed salmon, the owners and workers in harvesting and processing experienced a loss of \$473,000 of income. The local businesses that depend directly on the salmon industry's expenditures (boat repair, gear replacement, fuel, etc.) experienced a loss of \$127,000 of income.^{7/} Total reduced income suffered by businesses dependent upon household expenditures amounted to \$399,000. Of this amount, for example, the retail trade sector of the community showed an estimated decline of \$101,000. Because a large part of salmon industry revenue goes to labor, the general business sector in any dependent coastal community is affected as much or more than those businesses relying specifically on fishery-related expenses.

The timing of these effects depends a great deal upon the reaction of the local fishermen and households to changes in income. Changes in expenditures for fishing-related goods may take effect within a very short time in relationship to decreases or increases of harvesting income, and people involved of such businesses experience an almost immediate reduction in income as a result in reduced landings. Personal expenditures for items such as rents, medical bills, and groceries may not be affected for some time. Savings or other transfer payments may be used to keep some of these expenditures at a previous level. However, over time these sectors will also feel the effects of the changes in harvest income.

6/ Radtke and Jensen, 1985.

7/ Radtke and Jensen, 1985.